



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
WASHINGTON, D.C. 20460

OFFICE OF  
PREVENTION, PESTICIDES AND  
TOXIC SUBSTANCES

August 21, 1997

MEMORANDUM

SUBJECT: Review of Azinphos-Methyl Incident Reports, DPBarcode  
D238115, Chemical #058001, Reregistration #0235

FROM: Jerome Blondell, Ph.D., Health Statistician  
Chemistry and Exposure Branch II  
Health Effects Division (7509C)

Monica F. Spann, MPH, Environmental Protection Specialist  
Chemistry and Exposure Branch II  
Health Effects Division (7509C)

THRU: Susan V. Hummel, Senior Scientist  
Chemistry and Exposure Branch II  
Health Effects Division (7509C)

TO: Jack Arthur, Environmental Health Scientist  
Chemistry and Exposure Branch II  
Health Effects Division (7509C)

BACKGROUND

The following data bases have been consulted for the poisoning incident data on the active ingredient Azinphos-Methyl (PC Code: 058001):

- 1) OPP Incident Data System (IDS) - reports of incidents from various sources, including registrants, other federal and state health and environmental agencies and individual consumers, submitted to OPP since 1992. Reports submitted to the Incident Data System represent anecdotal reports or allegations only, unless otherwise stated. Typically no conclusions can be drawn implicating the pesticide as a cause of any of the reported health effects. Nevertheless, sometimes with enough cases and/or enough documentation risk mitigation measures may be suggested.
- 2) Poison Control Centers - as the result of Data-Call-Ins issued in 1993, OPP received Poison Control Center data covering the years 1985 through 1992 for 28 organophosphate and carbamate chemicals. Most of the national Poison Control Centers (PCCs) participate in a national data collection system, the Toxic Exposure Surveillance

System which obtains data from about 70 centers at hospitals and universities. PCCs provide telephone consultation for individuals and health care providers on suspected poisonings, involving drugs, household products, pesticides, etc.

3) California Department of Food and Agriculture (replaced by the Department of Pesticide Regulation in 1991) - California has collected uniform data on suspected pesticide poisonings since 1982. Physicians are required, by statute, to report to their local health officer all occurrences of illness suspected of being related to exposure to pesticides. The majority of the incidents involve workers. Information on exposure (worker activity), type of illness (systemic, eye, skin, eye/skin and respiratory), likelihood of a causal relationship, and number of days off work and in the hospital are provided.

4) National Pesticide Telecommunications Network (NPTN) - NPTN is a toll-free information service supported by OPP. A ranking of the top 200 active ingredients for which telephone calls were received during calendar years 1984-1991, inclusive has been prepared. The total number of calls was tabulated for the categories human incidents, animal incidents, calls for information, and others.

#### AZINPHOS-METHYL REVIEW

##### I. Incident Data System

Please note that the following cases from the IDS do not have documentation confirming exposure or health effects unless otherwise noted.

Listed below are reports of individual pesticide symptoms reported to the Louisiana Department of Agriculture in 1991, when azinphos-methyl was applied aerially resulting in spray drift exposures in the following cases. The cases were referred to enforcement at the state level.

An adult female experienced swollen eyes and pain in the sinuses.

A twenty-eight year old female reported noticing a strong foul smell.

A twenty-eight year old male noticed a bad odor across the street from him at the park.

A sixty-six year old female noticed a bad odor.

Six adults and one five year old child were seen at an emergency room and experienced symptoms which included headache, burning of the throat, and sinus trouble.

A thirty-eight year old female experienced symptoms which included : strange taste in mouth, skin and eye irritation, headache, abdominal pain, severe vomiting, diarrhea, weakness, and fainting. She was sent to the hospital because she fainted at her home and a second time in the parking lot at work as she was getting out of her car. Her symptoms were incurred over a few week period.

A twenty-six year old female experienced headache, and burning of the eyes.

Two females, a nine and fourteen year old experienced headache and burning of the eyes.

A seventeen year old male experienced headache, burning of the nose, and stomach pain.

A sixty year old female experienced throat irritation.

Five children and one adult experienced burning of the eyes, nose runs, and the oldest child experienced nausea. The adult went to a dermatologist because of her allergies.

A twenty-six year old female experienced lightheadedness, tired, sleepy, and weak. Her two year old son was exposed and specific symptoms were not specified.

An adult male experienced burning of the eyes.

An adult male felt nauseous.

A fifty-eight year old female experienced burning of the eyes and nose.

An eighteen year old male experienced a headache and felt ill.

A sixty-three year old male had difficulty breathing.

A forty-one year old female experienced an upset stomach, diarrhea, and nausea and her children experienced vomiting.

An adult male experienced burning of the eyes.

Two adults experienced abdominal pains, and three children experienced headache, abdominal pain, vomiting, and diarrhea.

Three children and two adults experienced headache, dizziness, vomiting, burning of the eyes, and weakness.

A pesticide incident occurred in 1993, when a woman called to report that her husband had sprayed and mixed azinphos-methyl and

oxamyl about three or four weeks before her call. He experienced symptoms of weakness, sweating, and diarrhea. The man was not wearing any Personal Protective Equipment (PPE) as the product label required. No further information on the disposition of the case was reported.

Listed below are reports of individual pesticide symptoms reported when azinphos-methyl was mixed, loaded, or applied and workers became ill. In some of the cases the workers were not wearing PPE. The cases were referred to the state level.

A worker was taken to the hospital for observation and was released the following day. The worker was not wearing PPE. Specific symptoms were not specified.

A worker was taken to the hospital for observation and was released the following day. The worker was bitten by a spider and had a swollen thumb. He indicated he may have had the flu. His cholinesterase level may have been low but no baseline was available for comparison.

A worker was taken to the hospital. Specific symptoms were not specified.

A worker was taken to the hospital. Specific symptoms were not specified.

A worker was taken to the hospital and held overnight for observation. The worker was wearing PPE and may have had a depressed cholinesterase, but no baseline was taken. This means the significance of the depression is difficult to judge.

A pesticide incident occurred in 1994, when a nineteen year old male sprayed azinphos-methyl, captan, and methomyl. He was admitted to the hospital three hours later with the following symptoms: tightness in the chest, nausea, vomiting, and abdominal pain. He was released three hours later after admission. No further information on the disposition of the case was reported.

Listed below are reports of individual pesticide symptoms involving azinphos-methyl and multiple pesticides reported to California, 1991 through 1992.

Five mixers/loaders and applicators developed systemic and skin illnesses after exposure to multiple pesticides over a five day period.

An applicator became systemically ill after working all day and was exposed to multiple pesticides. The cause of illness could not be determined.

A worker experienced itching all over his body.

A mixer/loader developed systemic and skin illnesses after exposure to multiple pesticides.

A pesticide incident occurred in 1995, when twenty-five orchard workers were exposed to azinphos-methyl when apples were sprayed the previous night. The workers experienced itching, rashes, dizziness, nausea, and eye irritation. No further information on the disposition of the case was reported.

A pesticide incident occurred in 1996, when workers became ill after entering an empty truck trailer which had recently hauled azinphos-methyl. They experienced headaches and nausea. No further information on the disposition of the case was reported.

A pesticide incident occurred in 1996, when a worker changed insect traps located in the middle of apple trees which are sprayed with azinphos-methyl in various orchards. The worker only wore shorts and did not follow the label instructions before re-entering the apple orchards. The worker experienced warts, muscle tension, sore hands, and a sore neck. No further information on the disposition of the case was reported.

A pesticide incident occurred in 1996, when an adult male was conducting research and testing on azinphos-methyl and other pesticides for four years. The man has experienced permanent and disabling physical injuries. No further information on the disposition of the case was reported.

A pesticide incident occurred in 1996, when a man, not wearing PPE was allegedly exposed to diluted azinphos-methyl from spray drift. He had not properly followed the label instructions which included wearing PPE. The man experienced nausea, and dizziness and was admitted to a health care facility. Thirteen days later, the man still reported having dizzy spells. No further information on the disposition of the case was reported.

A pesticide incident occurred in 1987, when a man was exposed to azinphos-methyl that was sprayed aerially to a cotton field in front of his home. The man became ill and his specific symptoms were not mentioned. No further information on the disposition of the case was reported.

## II. Poison Control Center Data

Azinphos-methyl was one of 28 chemicals for which Poison Control Center (PCC) data were requested. The following text and statistics are taken from an analysis of these data; see December 5, 1994 memo from Jerome Blondell to Joshua First.

The 28 chemicals were ranked using three types of measures:  
(A) number and percent occupational and non-occupational adult exposures reported to PCCs requiring treatment, hospitalization,

displaying symptoms or serious life-threatening effects; (B) California data for handlers and field workers comparing number of agricultural poisonings to reported applications; and (C) ratios of poisonings and hospitalization for PCC cases to estimated pounds reported in agriculture for pesticides used primarily in agriculture.

#### A. Occupational and Non-occupational Exposure

There were a total of 275 azinphos-methyl cases in the PCC data base. Of these, 99 cases were occupational exposure; 56 (56%) involved exposure to azinphos-methyl alone and 43 (43%) involved exposure to multiple chemicals, including azinphos-methyl. There were a total of 176 adult non-occupational exposures; 134 (76%) involved this chemical alone and 42 (24%) were attributed to multiple chemicals.<sup>1</sup>

In this analysis, four measures of hazard were developed based on the Poison Control Center data, as listed below.

1. Percent of all accidental cases that were seen in or referred to a health care facility (HCF).
2. Percent of these cases (seen in or referred to HCF) that were admitted for medical care.
3. Percent of cases reporting symptoms based on just those cases where the medical outcome could be determined.
4. Percent of those cases that had a major medical outcome which could be defined as life-threatening or resulting in permanent disability.

Exposure to azinphos-methyl alone or in combination with other chemicals was evaluated for each of these categories, giving a total of 8 measures. A ranking of the 28 chemicals was done based on these measures with the lowest number being the most frequently implicated in adverse effects. Table 1 presents the analyses for occupational and non-occupational exposures.

---

<sup>1</sup> Workers who were indirectly exposed (not handlers) were classified as non-occupational cases.

Table 1: Measures of Risk From Occupational and Non-occupational Exposure to Azinphos-methyl Using Poison Control Center Data from 1985-1992<sup>a</sup>

	Occupational Exposure	Non-occupational Exposure
Percent Seen in HCF		
Single chemical exposure	69.6 (68.2)	53.0 (44.0)
Multiple chemical exposure	76.8 (69.8)	58.5 (46.1)
Percent Hospitalized		
Single chemical exposure	23.1* <sup>5</sup> (12.2)	4.2 (9.9)
Multiple chemical exposure	25.0* <sup>5</sup> (14.3)	10.7 (12.6)
Percent with Symptoms		
Single chemical exposure	72.4 (85.8)	74.2 (74.0)
Multiple chemical exposure	84.2 (85.8)	75.0 (75.2)
Percent with Life-threatening Symptoms		
Single chemical exposure	0.0 (0.0)	0.0 (0.0)
Multiple chemical exposure	0.0 (0.5)	0.0 (0.05)

<sup>a</sup> Extracted from Tables 2, 3, 5 and 6 in December 5, 1994 memo from Jerome Blondell to Joshua First; number in parentheses is median score for that category

\* Top 25% of chemicals are ranked with a superscript of 1 to 7

Azinphos-methyl had the fifth highest percent hospitalized, but otherwise did not rank in the top 25% of pesticides for occupational Poison Control Center (PCC) cases (Table 1). Among non-occupational cases with sufficient numbers reported, azinphos-methyl did not rank in the top 25% on any of the measures

#### B. Ratios of poisoning - California Data

The incidence of **systemic poisoning cases** in agricultural workers reported to the California was compared to the number of applications of azinphos-methyl. Those calculations, along with the median score for a total of 29 pesticides, are presented in the Table 2 below.

Table 2: Systemic Poisonings/1,000 Applications in Selected Agricultural Workers Exposed to Azinphos-methyl in California, 1982-1989<sup>a</sup>

Pesticide	Number of Appl.	Poisonings/1,000 Appl. (N) Primary Pesticide Only			Poisonings/1,000 Appl. (N) Multiple Pesticide Exposure		
		Handler s	Field Workers	Total	Handlers	Field Workers	Total
Azinphos-methyl	50,531	.26 (13)	.77 (39)	1.03 (52)	.46 (23)	1.50 (76)	1.96 (99)
Median		.21	.20	.41	.44	.50	1.02

a Extracted from Table A5 in December 5, 1994 memo from Jerome Blondell to Joshua First; number in parentheses is the observed number of poisoned cases.

Azinphos-methyl had the third highest ratio of field worker poisonings per 1,000 applications in California when exposures to mixtures were included and when mixtures were excluded (See Table 7 in the December 5, 1994 memo.)

### C. Ratios of Poisoning - U.S. Poison Control Data

Active registrations of azinphos-methyl are for agricultural use exclusively. Ratios of the number of occupational Poison Control Center exposures to the reported pounds of the chemical used<sup>2</sup> were calculated. The results for azinphos-methyl and the median for the 15 agricultural chemicals included in the analysis are presented in the Table 3 below.

Table 3: Ratios of Azinphos-methyl Poisonings (PCC Data, 1985-1992) to Reported Use<sup>a</sup>

Pesticide	Exposure Per Use	Poisonings Per Use	Health Care Referral Per Use	Hospital Admitted Cases Per Use
Azinphos-methyl	.040* <sup>5</sup>	.019	.031* <sup>5</sup>	.008* <sup>4</sup>
Median	.033	.013	.027	.004

a Extracted from Table 9 in the December 5, 1994 memo from Jerome Blondell to Joshua First

\* Top 33% of chemicals are ranked with a superscript of 1 to 5

Among pesticides used exclusively in agriculture, azinphos-methyl had the fifth highest ratio of exposures and treatment to

<sup>2</sup> Gianessi, L.P., Puffer, C.A. Insecticide Use in U.S. Crop Production. Resources for the Future, Washington, D.C., 1992.



estimated pounds active ingredient reported in use and the fourth highest ratio for hospital admitted cases (Table 3). Taking all these factors together, azinphos-methyl ranked sixth among the 28 pesticides, in terms of potential poisonings risks to workers based on the indicators chosen.

#### D. Exposure in Children

A separate analysis of the number of exposures in children five years of age and under from 1985-1992 was conducted. For azinphos-methyl, there were 43 incidents; 33 involved exposure to azinphos-methyl alone. Compared to 16 other organophosphates and carbamates that 25 or more children were exposed to azinphos-methyl cases were less likely to require medical attention.

### III. California Data - 1982 through 1990

Detailed descriptions of 134 cases submitted to the California Pesticide Illness Surveillance Program (1982-1990) were reviewed. In 62 of these cases, azinphos-methyl was used alone and was judged to be responsible for the health effects. Only cases with a definite, probable or possible relationship were reviewed. Azinphos-methyl ranked 20th as a cause of systemic poisoning in California and 40th as a cause of hospitalization. One individual was hospitalized between 1982 and 1990. Table 1 presents the types of illnesses reported by year. Table 2 gives the total number of workers that took time off work as a result of their illness and how many were hospitalized and for how long.

Table 1: Cases Due to Azinphos-Methyl Exposure in California Reported by Type of Illness and Year, 1982-1990

Year	Illness Type					
	*Systemic	Eye	Skin	Respir.	**Comb.	Total
1982	4	-	-	-	-	4
1983	4	-	-	-	-	4
1984	3	2	-	-	-	5
1985	6	-	-	-	-	6
1986	-	1	-	-	-	1
1987	31	-	1	-	-	32
1988	3	-	-	-	-	3
1989	1	-	1	-	2	4
1990	1				2	3
Total	53	3	2	-	4	62

\* Category includes cases where skin, eye, or respiratory effects were also reported

\*\* Category includes eye/skin or eye/respiratory illnesses

Table 2: Number of Persons Disabled (taking time off work) or Hospitalized for Indicated Number of Days After Azinphos-Methyl Exposure in California, 1982-1990.

	Number of Persons Disabled	Number of Persons Hospitalized
One day	4	
Two days	3	1
3-5 days	2	
6-10 days		
more than 10 days	1	
Unknown	6	1

A total of 53 persons had systemic illnesses or 85.5% of 62 persons. Thirty-one of these cases occurred in 1987 including twenty-five systemic illnesses from non-occupational miscellaneous exposure due to azinphos-methyl being applied to an orchard that drifted nearby to residential areas. A variety of worker activities were associated with exposure to azinphos-methyl -as illustrated in Table 3 below.

Table 3: Illnesses by Activity Categories for Azinphos-Methyl Exposure in California, 1982-1990

Activity Category	Illness Category					Total
	*Systemic	Eye	Skin	Respiratory	*Combination	
Applgrou	10	-	2	-	2	14
Applhand	1	-	-	-	-	1
Coincidental	9	-	-	-	-	9
Driftexp	1	-	-	-	1	2
Driftnon	-	-	-	-	1	1
Emerresp	2	-	-	-	-	2
Mixloadg	1	3	-	-	-	4
Othernon	25	-	-	-	-	25
Resifield	3	-	-	-	-	3
Resicomm	1	-	-	-	-	1
Total	53	3	2	-	4	62

\* Category includes cases where skin, eye, or respiratory effects were also reported

\*\* Category includes eye/skin or eye/respiratory illnesses

According to the above activity categories, othernon (non-occupational miscellaneous exposure) systemic illnesses were associated with the majority of the exposures. The ten applgrou (ground applicator) systemic illnesses included symptoms of headache, nausea, itching, and cramps due to the application of azinphos-methyl.

California reported 9 cases of systemic poisoning due to

azinphos-methyl from 1990 through 1994 and one possible case of a skin rash in a worker picking pears. Four of the nine cases involved applicators. Cholinesterase tests were available for only one of these cases and was in the normal range. All four cases were considered "possible" in terms of azinphos-methyl causing the reported symptoms. Four cases involved exposure to residues in a recently treated field. Two workers thinning peaches were exposed from reentering one day prior to the expiration of the reentry interval. A irrigator and a man operating a mower were also exposed apparently prior to expiration of the reentry interval. In the remaining case a traffic officer responding to a chemical spill was exposed to azinphos-methyl and developed symptoms of headache and salivation. Direct overspray of azinphos-methyl on a residential population resulted in 40 cases of mild to moderate poisoning symptoms. California reported four cases involving reentry into a treated field, though apparently each case involved a violation of reentry time restrictions. (Blondell, J. Memorandum: Review of 1990-1994 Poisoning Data For Aldicarb, Azinphos-methyl, Carbofuran, Methamidophos, and Methomyl. June 26, 1996.)

#### IV. NPTN

On the list of the top 200 chemicals for which NPTN received calls from 1984-1991 inclusively, azinphos-methyl ranked number 50 and was reported to be involved in eighty-one human incidents and seven animal incidents.

#### V. Summary/Conclusions

Azinphos-methyl was one of 28 chemicals for which Poison Control Center data were requested. When both Poison Control Center and California data were considered, azinphos-methyl was judged sixth among 28 pesticides. In California it had the third highest ratio (1982-1989) for cases when the pesticide was considered the primary cause of poisoning of fieldworkers per 1,000 applications. Azinphos-methyl ranked fifth on percentage of occupational PCC cases requiring hospitalization. In terms of ratio of PCC hospital admitted cases per 1,000 pounds reported in use, azinphos-methyl ranked fourth and in terms of exposures and treatment per reported use it ranked fifth.

Earlier review of azinphos-methyl incident data concluded it was a significant problem, especially for fieldworker poisoning. Many of the reported cases have involved violation of the reentry interval or exposure to spray drift. The most recent five years of data from California have shown a significant drop from the earlier 1982-1989 data. It is not clear how much of this decline is due to safer work practices and how much is due to change in reporting.

## VI. Recommendations

Among 28 organophosphate and carbamate pesticides, azinphos-methyl was on the borderline between the top five and the other 22 in terms of various measures used to rank the hazard. Measures-to reduce spray drift and enforce reentry standards are recommended to prevent poisoning from this pesticide. Other measures to reduce applicator exposure and exposure in other handlers (e.g. closed mixing/loading systems) should be considered and made consistent with requirements for the other organophosphate and carbamate insecticides that are often used as alternatives or substitutes for azinphos-methyl and for each other.

cc: Correspondence  
Azinphos-methyl file (chemical no. 058001)  
RCAB - Mary Clock 7509C  
SRRD - Tom Moriarity 7508W

RDI: BrSrSci:SHummel: 8/13/97